

New record of giant anteater *Myrmecophaga tridactyla* (Pilosa, Myrmecophagidae) in Northeast Brazil

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Academic editor: A. M. Leal-Zanchet | Received 01 June 2018 | Accepted 29 December 2018 | Published 11 April 2019

Citation: de Matos Dias D, Miranda FR, Guimarães Rodrigues FH (2019) New record of giant anteater *Myrmecophaga tridactyla* (Pilosa, Myrmecophagidae) in Northeast Brazil. Neotropical Biology and Conservation, 14(1): 129–135. <https://doi.org/10.3897/neotropical.14.e34842>

Abstract

The giant anteater (*Myrmecophaga tridactyla*) is the largest living anteater, which due to several anthropic impacts, is threatened with extinction. So far, there was only one locality with a confirmed record of *M. tridactyla* in Northeast of Brazil. We present a new direct record of the species in Brazilian Northeast, registered in July 2017 by camera trap, in an arboreal caatinga area, municipality of Sento Sé, Bahia. This record is the second one of the species in the Caatinga Biome and confirms the occurrence of *M. tridactyla* in the state of Bahia. It constitutes the first direct record of *M. tridactyla* in more than 13 years of monitoring in the study area, suggesting that the species is locally rare.

Keywords

Caatinga, distribution, giant anteater

Introduction

The family Myrmecophagidae is composed of medium and large mammals with modern representatives divided into two genera, *Myrmecophaga* and *Tamandua*. Both *Tamandua tetradactyla* (LINNAEUS 1758) and *Myrmecophaga tridactyla* (LINNAEUS 1758) occur in Brazil (Gardner, 2007; Medri *et al.* 2011; Gaudin *et al.* 2018). Popularly known as the Giant anteater, *M. tridactyla* is the largest living anteater, weighing over 40 kg (Medri *et al.* 2011; Miranda *et al.* 2015). It is usually generalist in habitat use, occupying the Brazilian savanna (Cerrado biome), wetlands (Pantanal biome), forest patches, dry forest, and grasslands (Miranda *et al.* 2014; Gaudin *et al.* 2018). A population loss of at least 30% over the past 10 years has been estimated based on local extinctions, habitat loss, and deaths caused by fires and road kills. Based on this decline and past threats that are still ongoing today, it is likely that the population has suffered an overall reduction in population size of >30% over the last three generations (suspected to be around 21 years). Because of the real threats to this species and the noticeable declines, a precautionary assessment of Vulnerable A2cd is given (Miranda *et al.* 2014; MMA, 2014; Miranda *et al.* 2015).

The species is distributed from Central America to northern Argentina (Gardner, 2007). In Brazil, it occurs in all biomes, but in the Pampa is probably extinct and in the Caatinga there is a single confirmed record (Miranda *et al.* 2015). The Caatinga is a seasonally dry tropical forest that extends over a large part of South America. It is an exclusively Brazilian biome and covers approximately 11% of the country's territory, straddles all states of the Northeast region (Gariglio *et al.* 2010). The first record of giant anteater in the Caatinga was obtained in Serra da Capivara National Park (SCNP) where a skull was found in a hunting camp in 1991 (Olmos, 1995). The mention of the occurrence of *M. tridactyla* in northeastern Brazil occurred in the mid-XVII century. The german naturalist George Marcgravi was the first to describe and illustrate a giant anteater in his work entitled *Historiae Naturalis Brasiliae* (Marcgravi, 1648).

Monteiro da Cruz *et al.* (2002) cite the occurrence of *M. tridactyla* in six sites in the Pernambuco State, including the Serra Negra Biological Reserve, Timbaúba, Custódia, Sítio dos Moreiras, Igarassu and Água Preta, but they do not describe how records were obtained. Later, the presence of the species in the SCNP was confirmed by records in camera traps (Perez, 2008). The species was recorded in Chapada Diamantina National Park (Pereira and Geise, 2009) and in a locality in Paraíba (Feijó and Langguth, 2013) by interviews. The only documented record in state of Ceará comes from a skin from Parambu municipality, southwest of the state (Feijó and Langguth, 2013). Thus, except of the direct record of Peres (2008), records of *M. tridactyla* are anecdotal in the Brazilian Caatinga biome. Here we report a new record of *M. tridactyla* in the state of Bahia, including undoubtful images of it.

The field study was developed in the region of Boqueirão da Onça (Figure 1), north of the state of Bahia. The study area has approximately 900,000 hectares, extending over the municipalities of Sento Sé, Umburanas, Campo Formoso, Juazeiro

and Sobradinho, northern region of state of Bahia (Fukuda *et al.* 2010). This region is classified by the Brazilian Ministry of the Environment as extremely important for the conservation of biodiversity (MMA, 2016). In addition, during the study, the area was included in a new Protect Area, the Boqueirão da Onça National Park, proposed by the Brazilian Ministry of Environment.

The climate in the region is semi-arid with an average annual precipitation of 693 mm. The landscape is heterogeneous and includes several habitats such as “arboreal caatinga”, “valleys and plateaus” (Dias *et al.* 2019). We carried out a research with 60 camera-traps (Bushnell and Acorn Ltl-5210^a) between January and July of 2017 to estimate the occupancy patterns of medium and large-sized mammals in the area (see Dias *et al.* 2019). Cameras were always installed on trails and roads, with a minimum distance of 1.5 km between stations. In addition, cameras were to 40 cm above the ground in a tree, and in areas most likely to be used by mammals.

With a total effort of 8,570 traps-nights, covering an area of 535 km² (Minimum Convex Polygon of the cameras), we obtained 2,839 records of 21 species of wild mammals. On July 3, 2017 at 11:25 am *M. tridactyla* was filmed (Supplementary file) at a ranch located at coordinates 9°55'47.29"S; 41°3'29.83"W, 6 km from the village São Pedro in the municipality of Sento Sé. The phytophysognomy of the area where we obtained the record is composed by arboreal caatinga, at 880 m of altitude. Although water is a scarce resource in the region, there are two perennial water bodies about 2 km from the site where *M. tridactyla* was recorded (Figure 1).

To our knowledge, this is the first direct record of *M. tridactyla* confirmed for the state of Bahia and the second for Northeast Brazil. Even though this record does not expand considerably the range of *M. tridactyla*, especially regarding its entire distribution, it does extend its range in Northeast Brazil in about 300 km southeast of the area where there are recent records of the species (SCNP).

Our record confirms the presence of *M. tridactyla* in Boqueirão da Onça. Until now, there were only fossil records obtained in the Toca da Boa Vista cave (Cartelle and Hartwig, 1996; Marine Science Institute, UCSB) and reports of hunters about the occurrence of the species. However, this unique recent record of *M. tridactyla* in the study area despite the great camera-trap effort, is a convincing evidence of its rarity in the biome. Camera traps studies at Boqueirão da Onça have been carried out since 2006, initially by the National Research Center for Carnivore Conservation (CENAP-ICMBio) followed by the Institute for the Conservation of Neotropical Carnivores (Pró-Carnívoros Institute) and only now the species was recorded. Although *M. tridactyla* has some tolerance to human disturbed areas it generally avoids areas with high levels of contact with humans, cattle and other domestic animals (Shaw *et al.* 1987). The presence of domestic dogs, for example, is a potential threat. The incidence of dog attacks may reduce the probability of *M. tridactyla* occurrence and even cause its population decline (Lacerda *et al.* 2009). In the region of Boqueirão da Onça a large number of dogs is found in the villages near the natural areas and it is common that they make incursions into the forest areas (Dias *et al.* 2019). This situation is unsettling, since these animals have hunting skills and are

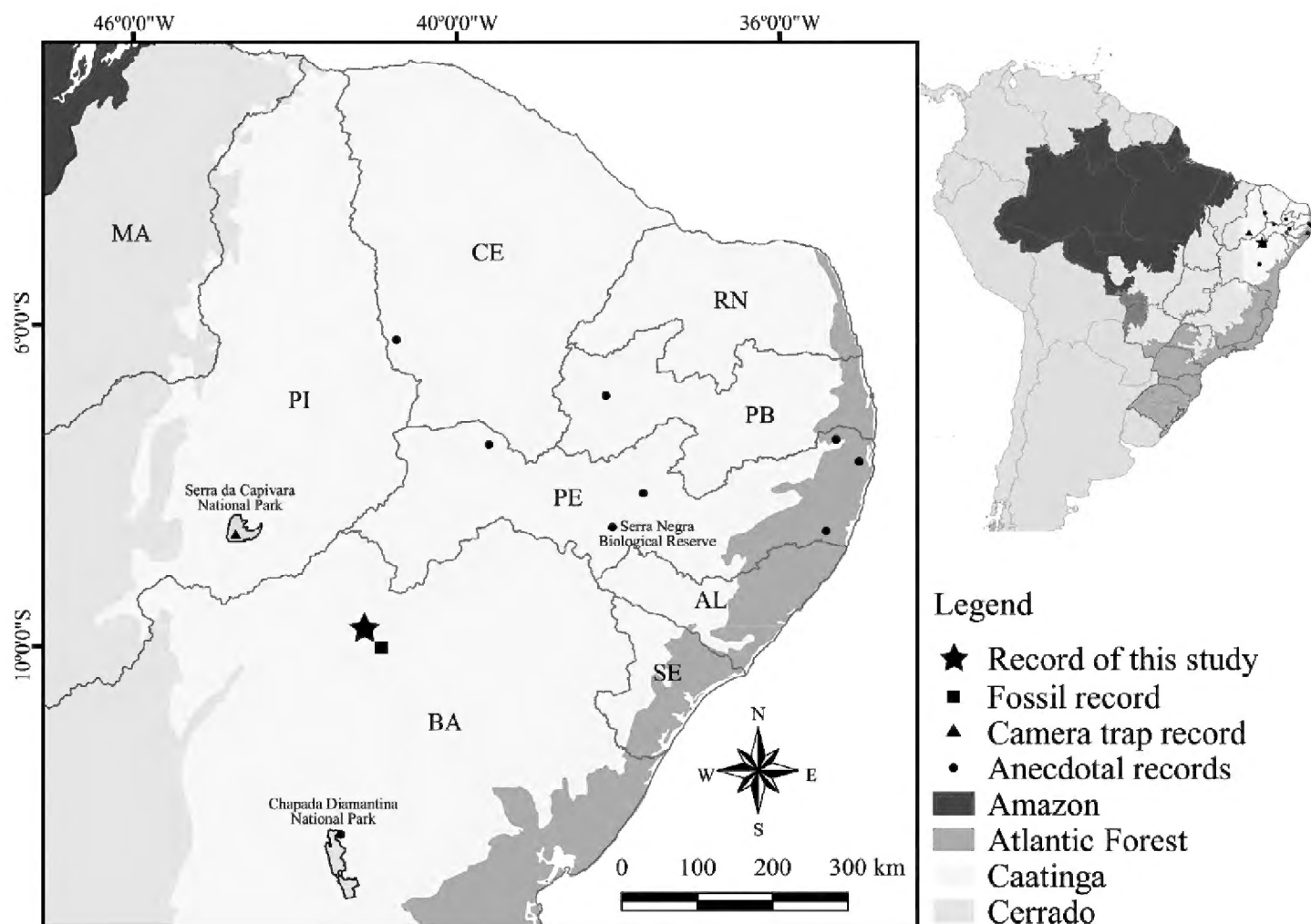


Figure 1. Study area and records of *Myrmecophaga tridactyla* in Northeast Brazil.

usually bred free. In addition, the growing establishment of wind farms in the study area has increased the number of new roads and trails in formerly remote sites (Dias *et al.* 2019). This has made it easier for hunters, dogs and other domestic animals to access natural habitats, notably threatening the species with great territorial requirements and sensitive to human presence.

Although anthropogenic impacts may threaten the persistence of *M. tridactyla*, the rarity of this species in the Caatinga may be related to historical and physiological factors. Its diet based strictly on prey with low calorie content, makes *M. tridactyla* distinct in its physiology with a lower body temperature and lower metabolism when compared with other mammals of similar body mass (McNab, 1984). Furthermore, its long coarse fur coat and large hairy tail provide them effective insulation. Thus, its minimal thermal conductance is 94% of what is expected for the body mass (McNab, 1984). This low value of minimal thermal conductance, together with large body mass, allows *M. tridactyla* to have a very wide region of thermoneutrality, between 15 °C and 36 °C, for an ant-eating specialist (McNab, 1984; Gaudin *et al.* 2018).

However, the annual average temperatures in the Caatinga range between 25 °C and 30 °C (Silva *et al.* 2017). In the dry months the absolute maximum temperatures exceed 40 °C (Prado, 2003), exceeding the upper limit of the thermoneutrality of *M. tridactyla*. Additionally, portions of the inland dry regions of the biome receive less than 600 mm of rainfall annually (Silva *et al.* 2017). The number of dry months increases from the

edges to the core of the region, with some areas experiencing periods of 7–10 months without water availability for plants, further reducing canopy cover (Prado, 2003).

Taking into account the physiological peculiarities of *M. tridactyla* and its responses at ambient temperature (Medri and Mourão, 2005), it is presumed that the survival of this species in the Caatinga is a great challenge considering the extreme environmental conditions in this biome. Thus, it is intriguing that some populations of *M. tridactyla* persist in an environment so adverse as the Caatinga. There is no evidence of physiological adaptations in mammals in the Caatinga related directly to the scarcity of water, although many species may adapt to this condition behaviorally (Carmingnotto and Astúa, 2017). In this sense, the need for water or how much *M. tridactyla* is physiologically adapted to the water deficit of the Caatinga deserves to be investigated, as well as its behavioral strategies in this biome.

With the creation of Boqueirão da Onça National Park, we expect better monitoring by environmental agencies, since *M. tridactyla* and other endangered species continue to be exposed to a series of impacts and anthropogenic pressures in the region. Our record expands the knowledge of the Caatinga mammalian fauna and the distribution of *M. tridactyla*, especially considering that the Boqueirão da Onça region is at the limit of the distribution of the species (Miranda *et al.* 2015). We also highlight the local rarity of this mammal, based on the low frequency of detection, since a single record occurred in more than 13 years of camera-trap monitoring in the region, including the present study. In this way, other species of common mammals of the Cerrado, which may also have restricted distributions in the Caatinga, should have their occurrence in this biome investigated.

Acknowledgments

This study was supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) through a postgraduate stipend to first author. We are especially grateful to Neotropical Grassland Conservancy and to The Rufford Foundation by the project support. To Claudia Martins for the support in obtaining the bibliographic references. Thanks to the editor and reviewers for their insightful comments.

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Resumo

Novo registro de tamanduá-bandeira *Myrmecophaga tridactyla* (Pilosa, Myrmecophagidae) na região Nordeste do Brasil

O tamanduá-bandeira (*Myrmecophaga tridactyla*) é o maior tamanduá vivente e, devido a vários impactos antrópicos, encontra-se ameaçado de extinção. Até o momento, havia apenas uma localidade com um registro confirmado de *M. tridactyla* no nordeste do Brasil. Apresentamos um novo registro direto de *M. tridactyla* no nordeste brasileiro, registrado em julho de 2017 por armadilha fotográfica em uma área de caatinga arbórea do município de Sento Sé, no estado da Bahia. Este é o segundo registro da espécie na Caatinga e confirma a ocorrência de *M. tridactyla* no estado da Bahia. Constitui-se no primeiro registro direto de *M. tridactyla* em mais de 13 anos de monitoramento na área de estudo, sugerindo que a espécie é localmente rara.

Palavras-chave

Caatinga, distribuição, tamanduá-bandeira

